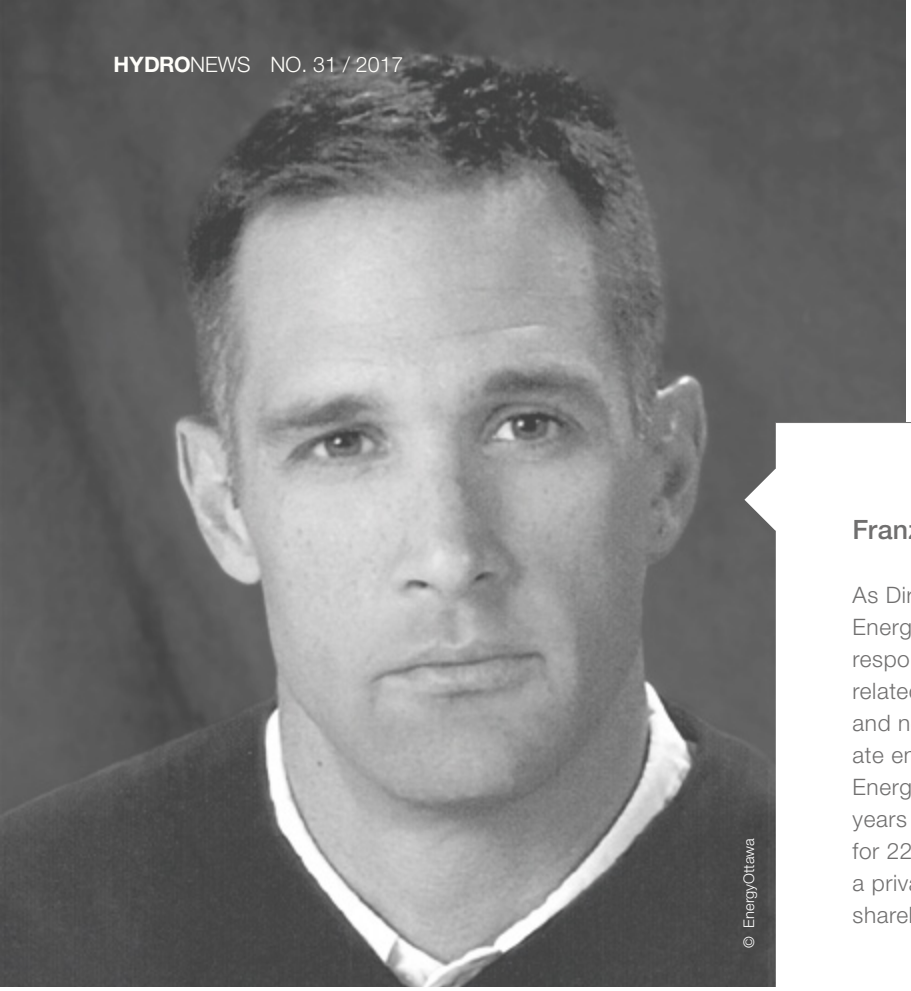
CHAUDIÈRE FALLS

Bringing Hydro to the Heart of the City

In the heart of the Canadian capital city Ottawa, the Chaudière Falls extension project is embracing the site's historical significance with a very modern approach to urban hydropower development. Hydro News discusses the new plant with developer Energy Ottawa's Director of Generation, Franz Kropp.

The Chaudière Falls site in the heart of the nation's capital is of major historical significance. Please explain how the design accommodated the historic context of its location?

From the late 1800s, it is one of the oldest hydroelectric plants that's still in operation in Canada. From a historical context the site is quite rich. The First Nations called the site Asticou, loosely translated to "big kettle". In more modern history, in the 1800s grist and saw mill operators began acquiring lands in the Chaudière Falls so the site is the cradle of Canadian industrialization. There is history related to the city of Ottawa becoming the capital of Canada, there's even a link to the iconic Stanley Cup. That history really needs to be shared and promoted. For example, we did uncover a couple of old stone grist mill wheels that would have been grinding wood into pulp and which are 150 years old. They'll be there on display with an interpretive panel beside them.



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Experience
further content

Franz Kropp

As Director of Generation for Energy Ottawa Franz Kropp is responsible for many of the facets related to both on-going operation and new developments. A graduate engineer, Franz has been with Energy Ottawa for just over 15 years and in the energy industry for 22 years. Energy Ottawa is a private corporation but its single shareholder is the city of Ottawa.

Located in the center of the Ottawa-Gatineau metropolitan area, the Chaudière Falls project has been built entirely below ground and is designed to have minimal visual impact, why was this design adopted?

The visual aspects of it go hand in hand with the urban context. When we acquired the project the design included a single story building. We eliminated that. The site is located on high land within the Ottawa River and there are some stunning views.

When you come out to the site you don't see a hydro plant, you see a public park space and you see the river. Some of the elements did come from public consultation, people wanting access to see the Chaudière Falls. These are areas where you can find win-win solutions. We could do it. Even though some risks were involved, they were manageable. We follow rigorous public health and safety guidelines but you can still achieve the physical barriers, for example, and there's a lot what can be done with landscaping to hide some of the security features. With a modest amount of effort you can overcome the technical elements that you need to keep people safe.

Chaudière Falls will supply renewable electricity to around 20,000 homes, reducing greenhouse gas emissions by some 115,000 tons of CO_2 every year. Explain the importance of environmental performance?

In terms of some of the aquatic species, when we acquired the project we did make some significant changes to the design related to aspects that had come into play throughout the time it took to acquire the assets. For example, the American eel went from a "species at risk" status to being listed formally on the "endangered species" register. That had an impact on some of the design decisions. Mitigation measures are required, for example fish ladders, screens and bypass paths to support migration. The power purchase agreement related to the hydroelectric plant was driven by a governmental policy to reduce fossil generation in the province through promotion of renewable electricity.

What unexpected challenges have arisen during the construction and installation phases of this project?

The main challenge was actually a geotechnical problem. The project is founded on a limestone bedrock but it has a characteristic of containing soluble calcitic deposits. When we got into the excavation of the intake canal we uncovered this zone about 5 to 6 m wide which ran perpendicular to the canal at a point where it was about 60 m wide. There was an engineered solution where a concrete cap was built on top which was then anchored into the solid bedrock on either side. It was discovered early on so we were able to avoid any delays.

The new 32 MW run-of-river power plant uses four of the most powerful ECOBulb turbines delivered to date. What were the main considerations in selecting these machines?*

It was actually quite a big step for us to adopt the technology. It was seen as a risk, but when we did the evaluation process – we had five submissions under the competitive tender – this option came out as

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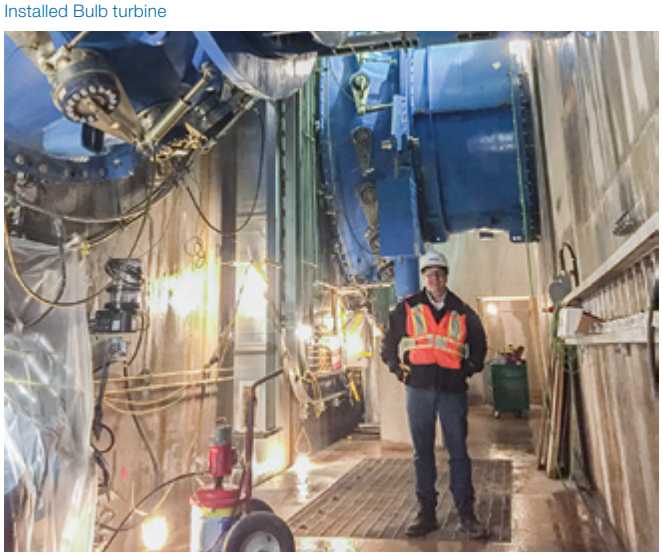
Ottawa Parkway and Skyline

very attractive from a commercial standpoint. For example, if you go with a vertical unit you have to make the powerhouse deeper, which are additional costs. Everything is also self-contained within the bulb and it's a fairly simple installation. So from the civil engineering side and the installation standpoint there's some significant advantages. There's a proven track record and because the overall costs were lower, those factors ended up out-weighing the risk that we saw with regards to the new technology. Plus it was all founded on fairly sound engineering practice.

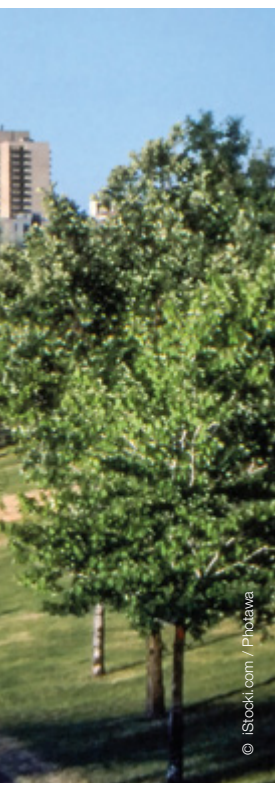
Installed Bulb turbine



We also put in the technical specification that solutions with no gearbox will be preferred, which was related to maintenance of the gearbox and the issue of bulk oil. Then there's the noise. We faced more stringent requirements due to the fact that we've got condominiums and high-rise towers along the intake canal and beside the powerhouse. It ended up becoming an additional benefit, although we didn't realize it at the time, because we likely would have run into noise issues and wouldn't have been able to obtain the noise permit that was required without additional attenuation equipment.

The Chaudière Falls expansion project was developed on a complete "from water-to-wire" basis. What was the motivation behind that decision?

The permitting, the construction and access in and around the site would have been very challenging for any EPC contractor but we felt that there was a lot of value in leveraging the relationships that we had for ease of permitting and getting buy-in from all of the different agencies concerned and in us assuming more of an active role within the construction. From our standpoint we're happy to take some risk on if we think that there's a benefit to it. If there's the opportunity to run further projects we definitely would, but it is very project specific. ANDRITZ HYDRO provided a very strong and very competitive proposal, compelling enough for us to be able to look past our classical hydro hats and the perceived risk of a newer technology and try a different approach to hydro. To date they've delivered. We're very pleased with the quality of the product that was manufactured and delivered on time.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"It comes back to the trying to promote more exposure to the river and to bring public access back to recognize and promote the river itself. It all comes together but I think from a project stand point it's unique."

Franz Kropp


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AUTHOR

Interview by David Appleyard,
a freelance journalist

What is your outlook on future projects of this kind?

A lot of people are looking at this project as one of the first modern-day hydroelectric developments in an urban setting. It's been done before, but it's been done a long time ago. Obviously the political, environmental and cultural landscapes have changed significantly since the 1930s and 40s, around the last time something like this would have been undertaken. Part of that success is going to be how well is it embraced by the public with the more welcoming approach where we're building a plant and putting a park on top of it. I think time will tell and hopefully it will be in our favor. If you look in Canada, the majority of cities are built on rivers. The river has to lend itself to hydropower generation, but ideally this would be a model for places where there are opportunities for hydroelectric development in the city and will obviously open up some new opportunities.
It can be done successfully. It'll be interesting to look back on it after several years and then see what success or influence it has had on future and similar projects.

CHAUDIÈRE FALLS IN SHORT

- 4 × 8 MW ECOBulb* turbines – the most powerful to date
- 164 GWh/year electricity feeding the provincial grid
- Powering 20,000 homes with clean, renewable energy
- Saving about 115,000 tons CO_2 emissions

- Home to Canada's oldest hydroelectric station still in operation;
- Safe viewing platforms and greater public access;
- A new bridge across the intake canal open for pedestrians;
- Maintaining elements of the city's industrialist past, including two buildings that survived the Great Fire of 1900;
- For the first time in more than 100 years, Chaudière Falls will be open to the public;




Installation of Bulb turbine